

CUMULATIVE INDEX 1994

Volume 15

March	RESPIRATORY EMERGENCIES I, pages 1-172
June	CLINICAL EXERCISE TESTING, pages 173-451
September	RESPIRATORY EMERGENCIES II, pages 453-606
December	RESPIRATORY DYSFUNCTION IN NEUROMUSCULAR DISEASE, pages 607-810

Note: Page numbers of issue and article titles are in **boldface** type.

- Abdomen, motion of, analysis of, in ventilatory impairment in neuromuscular disease, 758-759
- Abdominal displacement ventilators, in neuromuscular disease, 768-769
- Abdominal muscles, 630-631
- Abscess, lung, massive hemoptysis due to, 150
- Acid maltase deficiency myopathy, respiratory dysfunction in, 667
- Acidosis, life-threatening, correction of, in COPD patients with acute respiratory failure, 489
- metabolic, exercise in COPD and, 314-315
- Acrolein, inhalation injury due to, 113
- Acute steroid myopathy, respiratory dysfunction in, 671
- Adenosine triphosphate (ATP), in skeletal muscle energetics, 173-176
- β -Adrenergic agents, for respiratory failure in COPD, 489-490
- β -Adrenergic agonists, for severe asthma, 457-460
- Adult respiratory distress syndrome (ARDS), 517-546.
- See also *Lung injury, acute*.
- causes, 501
- clinical course, 523-525
- described, 517-518
- incidence, 517
- outcome following, 523-525
- pathophysiology, 519-520
- Aerophagia, in COPD patients with acute respiratory failure, 492
- Age, of exercise training program participants, 223-224
- Air embolism, systemic, 86
- Airflow obstruction, in asthma, 455-457
- Airway(s), artificial, in mechanical ventilation, 56-59
- assessment, in chest trauma, 137-138
- iatrogenic complications affecting, upper airway obstruction due to, 39-41
- infection of, respiratory failure in COPD due to, 483-484
- maintenance of, in acute respiratory failure, 10-11
- upper, anatomy of, 35, 36
- muscles of, 632-633
- Airway management, in respiratory emergencies, 13-34
- asthma, 29-30
- cricothyroidotomy in, 20-21
- general principles, 13-14
- massive hemoptysis, 28
- medications for, 23-25
- percutaneous transtracheal ventilation in, 21-22
- special circumstances in, 25-30
- surgical routes, 20-23
- tracheostomy in, 22-23
- translaryngeal intubation, nonsurgical routes, 15-20
- trauma, 25-28
- upper airway obstruction, 28-29, 46-48
- Airway obstruction, in exercise-induced asthma, 352
- mechanisms of, 353-355
- upper, 35-53
- causes, 35, 39-44
- clinical evaluation, 38-39
- in COPD patients with acute respiratory failure, 486
- diagnostic evaluation, 44-46
- differential diagnosis, 40
- exercise effects, 37-38
- fixed, 37
- infection and, 43-44
- pathophysiology, 35-38
- treatment, 28-29, 46-48
- nontraumatic, 28-29
- variable extrathoracic, 36-37
- variable intrathoracic, 37
- Airway rewarming, exercise-induced asthma due to, 353-354
- Albuterol, for severe asthma, 458-461
- Alcohol, acute pulmonary insufficiency due to, 99
- Alfentanil, in airway management, 24
- Alveolar-arterial gas exchange, exercise testing effects on, 186-188
- Alveolar-arterial oxygen difference: $P(A-a)O_2$, 2-3
- Alveolar rupture, mechanical ventilation and, 530-532
- Aminophylline, for severe asthma, 460
- Amiodarone, respiratory failure due to, 94-95
- Ammonia, inhalation injury due to, 105-106
- Amniotic fluid embolism, 574-576
- described, 574
- diagnosis, 575
- pathophysiology, 574-575
- treatment, 575-576

- Amphotericin B, respiratory failure due to, 96
- Amyotrophic lateral sclerosis (ALS), described, 675
- incidence, 675
- pulmonary function testing in, 676-679
- respiratory dysfunction in, 675-681
- respiratory failure in, 675-676
- prevention, 679
- treatment, 679
- ventilatory support in, 775
- Anaerobic threshold, in cardiopulmonary exercise testing, 423-424
- noninvasive, 273-275
- determination of, methods for, 204
- Anemometer, in cardiopulmonary exercise testing, 195
- Anesthesia/anesthetics, in airway management, 23-24
- Angina, Ludwig's, upper airway obstruction due to, 44
- Angioedema, upper airway obstruction due to, 42-43
- Anti-inflammatory drugs, nonsteroidal (NSAIDs), for acute lung injury, 541
- respiratory failure due to, 94
- Anticholinergic agents, for severe asthma, 460-461
- Anticoagulant(s), for pulmonary embolism, 551-552
- Antidepressant(s), tricyclic, acute pulmonary insufficiency due to, 99
- Aortic insufficiency, in acute cardiogenic pulmonary edema, 507
- Aortic stenosis, in acute cardiogenic pulmonary edema, 506-507
- ARDS. *See Adult respiratory distress syndrome.*
- Arm cranking, 342
- upper extremity training with, 343-344
- Arm ergometry, 200, 342
- Arm exercise, anatomic and mechanical considerations in, 339-341
- cardiac and metabolic response to, 342-343
- in COPD, 345
- gas exchange response in, 343
- unsupported, 344-345
- Arm exercise testing, 342
- Arm training, unsupported, 345-347
- Arterial blood gases, in ventilatory impairment in neuromuscular disease, 755
- Arterial oxygen saturation, in noninvasive cardiopulmonary exercise, 278
- Arteriography, in massive hemoptysis, for localization of bleeding, 155
- in management, 161-162
- Asphyxiants, inhalation injury due to, 110-112
- Aspiration, of acid food particles, 125
- acid liquid, 121-124
- of blood, 125
- emergencies related to, 117-135
- of gastric contents, 124-125
- acute lung injury due to, 522
- of hydrocarbons, 125-127
- of liquids, 121-127
- of nonacid food particles, 125
- prevention, 127-128
- risk factors for, 117-118, 119
- of solid materials, 118-121
- Asthma, airway management in, 29-30
- death due to, 453
- exercise-induced, 351-368
- airway obstruction in, 352
- causes, 353-355
- clinical evaluation, 356
- clinical pattern of, 351-352
- defined, 351
- diagnosis, 356-358
- exercise programs in, 362-364
- inflammation in, 354-355
- late-phase response in, 356
- pathophysiology, 351-356
- refractory period in, 355-356
- symptoms, 351
- treatment, 358-362
- in difficult-to-manage patients, 361-362
- drugs, 359-362
- nonpharmacologic, 358-359
- fatal, 453, 454
- life-threatening, 453-479. *See also Asthma, severe.*
- severe, 453-479
- clinical assessment, 455-457
- epidemiology, 453-455
- morbidity and mortality, 473-475
- posthospitalization prognosis, 475-476
- treatment, 457-475
- β -adrenergic agonists, 457-460
- aminophylline, 460
- anticholinergic agents, 460-461
- bronchodilators, 471
- buffer therapy, 471-472
- complications, 473-476
- corticosteroids, 461-463
- endotracheal intubation, 463-465
- magnesium sulfate, 463
- mechanical ventilation, 465-469
- nonventilator, 469-473
- sedation, 469-471
- unconventional, 472-473
- severity of, increase in, 453
- Asynchrony, respiratory distress due to, 61-62
- Atropine methonitrate, for respiratory failure in COPD, 490
- Auto-PEEP, mechanical ventilation and, 62-64
- Balke protocol, in cardiopulmonary exercise testing, 198-199
- Balloon tamponade, in massive hemoptysis management, 159
- Barbiturate(s), acute pulmonary insufficiency due to, 99
- Barotrauma, 75, 86-88
- clinical forms of, 75
- defined, 75
- management, 88-89
- mechanical ventilation and, 64-65, 530-532
- Benzodiazepine(s), in airway management, 24
- Beta-adrenergic agents, in exercise-induced asthma, 359-360
- Beta-blockers, respiratory failure due to, 95
- Bleeding, gastrointestinal, 492-493
- Bleomycin, respiratory failure due to, 96
- Blood, aspiration of, 125
- Blood gas(es), arterial, in exercise testing in pulmonary patients, 335
- changes in, exercise in patients with lung disease and, 332-333
- exercise in COPD and, 313-314
- Blood gas analysis, arterial, in asthma, 457
- in respiratory failure, 482
- in Guillain-Barré syndrome, 708-710
- Blood lactate levels, in exercise training program, 222
- Blood pressure response, in noninvasive cardiopulmonary exercise testing, 275-277
- Botulism, poisoning due to, 100
- Brainstem, and neuromuscular disease, 614
- strokes of, 730-731

- Breath-by-breath analysis, in cardiopulmonary exercise testing, 197
- Breathing, difficult. See *Dyspnea*.
- disorders of, sleep-related, in ventilatory impairment in neuromuscular disease, 752
- efficiency of, 625
- impedance to, during exercise, 250-252
- in myasthenia gravis, 685
- ventilation in, 607-609
- work of, 625
- Breathing patterns, abnormal, CNS injury and, 741-742
- in cardiopulmonary exercise testing, 426-427
- during exercise, in the elderly, 232-233
- in interstitial lung disease, 288-290
- exercise in COPD and, 309-310
- Breathing reserve, in cardiopulmonary exercise testing, 207-208, 425-426
- Breathlessness. See *Dyspnea*.
- Bromocriptine, pleuropulmonary disease due to, 724
- Bronchial irrigation, in massive hemoptysis management, 158
- Bronchiectasis, massive hemoptysis due to, 149
- Bronchitis, acute, respiratory failure in COPD due to, 483-484
- Bronchoalveolar lavage (BAL), quantitative culture of, in nosocomial pneumonia diagnosis, 595-596
- Bronchodilator(s), for respiratory failure in COPD, 489-490
- for severe asthma, 471
- Bronchography, for localization of bleeding in massive hemoptysis, 155-156
- Bronchoscopic dilatation, in upper airway obstruction, 48
- Bronchoscopy, in massive hemoptysis, for localization of bleeding, 154-155
- in management, 158-159
- Bronchospasm, exercise-induced, 333
- Bruce protocol, in cardiopulmonary exercise testing, 198
- Buffer therapy, for severe asthma, 471-472
- Cadmium, inhalation injury due to, 109-110
- Calcium channel blockers, in exercise-induced asthma, 361
- Carbon dioxide, exercise training effects on, 218
- role during exercise, 249
- in skeletal muscle energetics, 175-176
- Carbon dioxide ventilatory response, evaluation, 610
- Carbon monoxide, inhalation injury due to, 110-111
- Cardiac injuries, diagnosis and treatment, 143
- Cardiac massage, closed-chest, for venous air embolism, 573
- Cardiac output, optimization of, in acute lung injury, 539
- Cardiac tamponade, in chest trauma, 140-141
- Cardiopulmonary exercise testing, 193-213. See also *Exercise testing, cardiopulmonary*.
- Cardiopulmonary system, exercise effects on, 305-306
- Cardiorespiratory disorders, dyspnea effects on, 253-254
- Cardiovascular disease, cardiopulmonary exercise testing in, 271-285
- anaerobic threshold, 273-275
- arterial oxygen saturation, 278
- blood pressure response, 275-277
- chronotropic dysfunction evaluation, 282-283
- clinical applications of, 279-284
- in diastolic dysfunction, 280
- in heart failure, 280
- heart rate response, 275-277
- in heart transplantation, 280-282
- invasive, 278-279
- maximal oxygen uptake, 271-273
- noninvasive, 271-278
- oxygen pulse, 277
- in pulmonary hypertension, 283-284
- in pulmonary vascular disease, 283-284
- in systolic dysfunction, 279-280
- ventilation measurements, 278
- Cardiovascular system, assessment, in chest trauma, 138-141
- exercise testing effects on, 176-180
- Catheter(s), Swan-Ganz, for acute lung injury, 538-539,
- transtracheal, upper airway obstruction due to, 41
- Catheterization, cardiac, invasive, in lung resection evaluation, 390-391
- pulmonary artery, in acute cardiogenic pulmonary edema, 507-508
- Central nervous system (CNS), trauma to, management, 743-746
- normal respiratory control and, 740-741
- respiratory complications of, 741-743
- respiratory dysfunction associated with, 739-749
- epidemiology, 739-740
- Cervical spine injury, airway management in, 25-26
- Chest trauma, 137-146
- airway management in, 27-28
- assessment, airway, 137-138
- of cardiovascular function, 138-141
- initial, 137
- chest wall injuries, 142-143
- crush injury, diagnosis and treatment, 143
- flail chest, 142-143
- incidence, 137
- pneumothorax in, 138
- types, 141-145
- Chest wall, injuries of, diagnosis and treatment, 142-143
- Chlorine, inhalation injury due to, 106
- Chronic obstructive pulmonary disease (COPD), acute respiratory failure in, 481-500
- airway infection and, 483-484
- airway obstruction due to, 486
- assessment, 481-482
- causes, 482-486
- complications, 492-493
- dysrhythmias in, 492
- ethical and societal issues related to, 496-497
- fluid status assessment, 485
- heart function assessment, 485
- management, 482, 486-495
- mechanical ventilation for, 493-495
- natural history of, 495-496
- patient noncompliance and, 486
- pleural effusions and, 486
- prognosis, 495-496
- pulmonary embolism and, 484
- rib fractures and, 486
- spontaneous pneumothorax and, 486
- exercise in, 305-326
- arm, 345
- blood gases, 313-314
- breathing pattern, 309-310
- contraction patterns of respiratory muscles, 312-313
- heart function, 314
- inspiratory muscle fatigue, 313
- inspiratory muscle function, 311-312
- metabolic acidosis, 314-315
- metabolic rate, 306-308
- pulmonary mechanics, 310-311
- ventilation, 308-309
- exercise intolerance in, 305

- Chronic obstructive pulmonary disease (COPD) (*Continued*)
 exercise limitation in, 316-319
 exercise physiology in, 306-319
 exercise testing in, 319-323
 interpretation of, 321-323
 methods, 320-321
 protocols for, 320
 purpose of, 319-320
 reproducibility of variables during, 320
 safety of, 321
 uses, 319
 incidence, 481
 spontaneous pneumothorax in, 79-80
 Chronotropic dysfunction, evaluation, 282-283
 Circulation, respiratory muscle effects on, 626-627
 CNS. *See Central nervous system.*
 Coagulants, topical, in massive hemoptysis management, 159
 Cocaine, respiratory insufficiency due to, 97-98
 Colchicine, acute pulmonary insufficiency due to, 99
 Colloid(s), for acute lung injury, 538
 Computed tomography (CT), for localization of bleeding in massive hemoptysis, 156-157
 upper airway obstruction due to, 45
 Condensate, respiratory distress due to, 60
 Congenital myopathies, respiratory dysfunction in, 666-667
 Congenital myotonic dystrophy, respiratory dysfunction in, 666
 Congestion, pulmonary, during exercise, in the elderly, 240
 Contrast media, respiratory failure due to, 96
 Controlled hypoventilation, 465
 Conventional tomography, upper airway obstruction due to, 45
 COPD. *See Chronic obstructive pulmonary disease.*
 Corticosteroid(s), for acute lung injury, 541
 in exercise-induced asthma, 361
 in fat embolism syndrome, 566-568
 in respiratory failure in COPD, 491
 in severe asthma, 461-463
 in upper airway obstruction, 47
 Cough, respiratory distress due to, 58
 stroke and, 734
 in ventilatory impairment in neuromuscular disease, 752
 Craniofacial trauma, airway management in, 26-27
 Cricothyroidotomy, in airway management, 20-21
 Cromolyn, in exercise-induced asthma, 360
 Croup, upper airway obstruction due to, 43
 Cyanide, hydrogen, inhalation injury due to, 111-112
 poisoning by, treatment, 111
 Cycle ergometer, in cardiopulmonary exercise testing, 193-194
 protocols in, 199-200
 Cycle ergometry, arm, 342
 Cystic fibrosis, massive hemoptysis due to, 152
 Cytosine arabinoside, respiratory failure due to, 95
 neuromuscular junction affected by, 653-655
 innervation of, muscle fiber properties affected by, 648
 muscle fiber type composition of, 646-647
 physiology, 642-644
 recruitment, 644-646
 Diaphragm muscle, 627-629
 activation pattern of, physiologic effects, 641
 denervation of, 641-659
 myosin heavy chain phenotype, 647-648
 weakness of, evaluation, 676
 Diastolic dysfunction, cardiopulmonary exercise testing for, 280
 described, 506
 Diazepam, in airway management, 24
 Diffusing capacity, in lung resection evaluation, 390
 Diffusion, abnormal, in acute respiratory failure, 7
 Disability, impairment versus, 370-371
 Disability evaluation, exercise testing in, 369-387. *See also Impairment evaluation, exercise testing in.*
 Diuretic(s), thiazide, respiratory failure due to, 95
 L-Dopa, for Parkinson's disease, respiratory dysfunction due to, 721-724
 Drowning, incidence, 128
 Drug(s), for acute lung injury, 539-541
 acute lung injury due to, 522-523
 in airway management, 23-25
 in exercise-induced asthma, 359-362
 hypoventilation due to, 97
 neuromuscular blockade due to, 97
 overdose of, acute pulmonary insufficiency due to, 98-99
 respiratory failure due to, 93-102
 amiodarone, 94-95
 amphotericin B, 96
 beta-blockers, 95
 bleomycin, 96
 contrast agents, 96
 cytosine arabinoside, 95
 dextran, 96
 insulin, 97
 interleukin-2, 97
 intravenous hydrocortisone, 94
 methotrexate, 95-96
 naloxone, 94
 neuromuscular blockade, 96
 nitrofurantoin, 96
 NSAIDs, 94
 penicillamine, 95
 protamine, 95
 salicylates, 94
 thallium-dipyridamole imaging, 97
 thiazide diuretics, 95
 tocolytics, 95
 respiratory insufficiency due to, 97-98
 Drug abuse, pneumothorax-associated with, 80
 Duchenne muscular dystrophy, advanced stages of, 664-665
 P₅₁ in, 612-613
 respiratory dysfunction in, 663-665
 ventilatory support in, 774-775
 Dynamic hyperinflation, 466-468
 mechanical ventilation and, 62-64
 Dyspnea, in acute lung injury, 520
 in asthma, 455-456
 in cardiopulmonary exercise testing, 430
 cause, 248
 defined, 247
 exertional, assessment, 254-255
 cardiac disease related to, 262-263
 causes, 260
 "Deep sulcus sign," 531
 Dextran, respiratory failure due to, 96
 Diaphragm, injuries to, diagnosis and treatment, 145
 paralysis of, in ventilatory impairment in neuromuscular disease, 754
 Diaphragm motor unit, activity of, muscle fiber properties affected by, 648-653
 inactivity of, motoneuronal properties affected by, 655

- characteristics, 261
- clinical evaluation, 259-269
- described, 248-249, 261
- in the elderly, 239
- in interstitial lung disease, 291
- laboratory testing in, 262-264
- limitation in cardiorespiratory disorders due to, 253-254
- mechanisms of, 247-257
- medical history in, 259-262
- physical examination in, 262
- respiratory disease related to, 263-264
- systems analysis of, 249-252
- unexplained, 264
- measurement of, during exercise, 265-267
- mechanisms in, 247-248
- sensory limitation to, 252-253
- in ventilatory impairment in neuromuscular disease, 752, 760
- Dysrhythmia(s), in COPD patients with acute respiratory failure, 492
- Dystrophy(ies), facioscapulohumeral, respiratory dysfunction in, 666
- limb girdle, 666
- muscular. *See Muscular dystrophies.*
- myotonic, congenital, respiratory dysfunction in, 666
- respiratory dysfunction in, 665-666
- ECG. *See Electrocardiogram.*
- Edema, glottic, intubation and, 40
- pulmonary. *See Pulmonary edema.*
- Elderly, exercise in, practical considerations concerning, 243-244
 - pulmonary system's response to, 229-246. *See also Pulmonary system, exercise effects on, in the elderly.*
 - structural and functional changes in, 230-231
- Electrocardiogram (ECG), in cardiopulmonary exercise testing, 207
 - in exercise testing in pulmonary patients, 334-335
- Electrolyte disorders, respiratory dysfunction in, 671
- Electromyography (EMG), in respiratory muscle evaluation, 610
- Electronic signals, processing of, in cardiopulmonary exercise testing, 195-197
- Embolectomy, for pulmonary embolism, 556
- Embolism, amniotic fluid, 574-576
 - pulmonary, respiratory failure in COPD due to, 484
 - tumor, 568-569
 - venous air, 570-574. *See also Venous air embolism.*
- Embolotherapy, in massive hemoptysis management, 161-162
- Emphysema, pulmonary interstitial, 86
- subcutaneous, 86
- Encephalitis lethargica, 715
- Endobronchial blockade, in massive hemoptysis management, 159-161
- Endocrine myopathies, respiratory dysfunction in, 670-671
- Endotracheal cuff, failure of, respiratory distress due to, 57-58
- Endotracheal intubation, for Guillain-Barré syndrome, 710-711
- Endotracheal tube, double-lumen, in massive hemoptysis management, 160-161
- failure of, respiratory distress due to, 57-58
- malposition of, respiratory distress due to, 56-57
- Endurance training, purpose of, 215
- Epiglottitis, upper airway obstruction due to, 43-44
- Epinephrine, in massive hemoptysis management, 158
- racemic, in upper airway obstruction, 47
- for severe asthma, 457-458
- Equipment, in cardiopulmonary exercise testing, 193-195
- Ergometry, arm, 200
- Ergot derivatives, pleuropulmonary disease due to, 724
- Esophagus, injuries to, diagnosis and treatment, 145
- Ethical issues, in long-term ventilatory support, 787-789
- Ethylchlorvynol, respiratory insufficiency due to, 98
- Exercise, arm, 339-349. *See also Arm exercise.*
 - asthma and, 351-368. *See also Asthma, exercise-induced.*
 - carbon dioxide's role during, 249
 - cardiorespiratory responses to, 305-306
 - in COPD, 305-326. *See also Chronic obstructive pulmonary disease, exercise in.*
 - dyspnea during, measurement of, 265-267
 - in the elderly, practical considerations concerning, 243-244
 - intensity of, domains of, 189-191
 - in exercise training program, 220-221
 - in interstitial lung disease, breathing pattern, 288-290
 - dyspnea, 291
 - gas exchange, 291-292
 - heart function, 292
 - mechanics of, 290-291
 - physiology of, 287-296
 - respiratory muscles, 292-294
 - ventilation, 288-290
 - oxygen delivery during, 249
 - in pulmonary rehabilitation, 327-337. *See also Pulmonary rehabilitation, exercise in.*
 - pulmonary system's effects of, in the elderly, 229-246. *See also Pulmonary system, exercise effects on, in the elderly.*
 - in young adults, 229-230
 - respiratory muscle weakness and fatigue during, 252
 - upper airway obstruction effects of, 37-38
 - upper extremity, clinical use of, 339-349. *See also Arm exercise.*
 - ventilatory demands of, 249-252
- Exercise intolerance, in COPD, 305
- described, 173
- Exercise limitation, in cardiopulmonary exercise testing, 430
 - in lung and heart-lung transplant recipients, 416-418
- Exercise performance, pulmonary system's limitations to, in the elderly, 241-243
- Exercise testing, alveolar-arterial gas exchange in, 186-188
- bioenergetic and gas exchange basis of, 173-192
- cardiopulmonary, 193-213
 - abnormalities in, patterns of, 430-431
 - anaerobic threshold in, 204-207
 - breath-by-breath analysis, 197
 - breathing reserve in, 207-208
 - cardiopulmonary measurements in, 194-195
 - in cardiovascular disease, 271-285. *See also Cardiovascular disease, cardiopulmonary exercise testing in.*
 - conduct of, 200-203
 - contraindications, 201
 - ECG in, 207
 - electronic signals in, processing of, 195-197
 - equipment for, 193-195
 - calibration of, 194
 - exercise limitation in, 430
 - integrative, 371-373
 - interpretation of, 421-445
 - abnormalities in, 430-431
 - anaerobic threshold in, 423-424
 - breathing patterns in, 426-427

Exercise testing (*Continued*)

- breathing reserve in, 425-426
- case studies, 431-443
- dyspnea in, 430
- heart rate in, 424-425
- maximum aerobic capacity in, 421-422
- measurements and relationships in, 421-425
- pulmonary gas exchange in, 427-430
- respiratory factors in, 425
- invasive versus noninvasive, 200
- in lung and heart-lung transplantation, 405-420. See also *Heart-lung transplantation; Lung transplantation, exercise testing in.*
- measurements during, 203-207
- mechanical simulator in, 198
- metabolic measurements in, equipment for, 194-195
- mixed chamber in, 197
- normal reference values in, 209-210
- oxygen pulse in, 207
- physiologic validation in, 198
- preliminary requirements for, 201
- procedure for, 201-202
- protocols in, 198-200
- quality assurance in, 197-198
- cardiovascular responses to, 176-180
- in COPD, 319-323. See also *Chronic obstructive pulmonary disease, exercise testing in.*
- exercise intensity domains in, 189-191
- gas exchange in, 181-184
- in impairment and disability evaluation, 369-387. See also *Impairment evaluation, exercise testing in.*
- in interstitial lung disease, 287-303. See also *Lung disease(s), interstitial, exercise testing in.*
- issue on, 173-445
- lactate threshold in, 177, 178, 180-181
- in lung resection evaluation, 393-400
- in pulmonary rehabilitation, 328-333
- purpose of, 215
- ventilatory requirements in, 184-186
- Exercise tolerance, of COPD patients, 329-330
- Exercise training, carbon dioxide effects of, 218
- oxygen uptake effects of, 216-220
- physiologic responses to, 215-227
- mechanisms of, 220
- program for. See *Exercise training program.*
- in pulmonary rehabilitation, 327-337
- pulmonary ventilation effects of, 218
- structural and biochemical changes induced by, 215-216
- types, 215
- Exercise training program, age of participants in, 223-224
- blood lactate levels in, 222
- characteristics, 220-225
- designing of, 224
- duration of, 223
- in exercise-induced asthma, 362-364
- exercise intensity of, 220-221
- gender of participants in, 224
- and health, 225
- heart rate in, 221-222
- level of fitness in, 223
- maintaining fitness through, 224-225
- modes of exercise, 223
- oxygen uptake in, 222
- sessions in, duration of, 223
- frequency of, 223
- Exercise training response, in pulmonary rehabilitation, 328
- Expiratory muscle(s), described, 340-341
- Expired gas analysis, in exercise testing in pulmonary patients, 335
- Extracorporeal membrane oxygenation (ECMO), for acute lung injury, 535-536
- Extremities, upper, exercise of, clinical use of, 339-349
- Facioscapulohumeral muscular dystrophy (FSH), respiratory dysfunction in, 666
- ventilatory responses in, 613
- Fast twitch, 173
- Fat embolism syndrome, 561-568
- clinical features, 562-563
- clinical manifestations, 562-565
- dermatologic manifestations, 565
- diagnosis, 565-566
- incidence, 562
- neurologic abnormalities in, 563
- pathogenesis, 565
- respiratory impairment in, 563-565
- treatment, 566-568
- Fatigue, respiratory muscle, 624-625
- Fenoterol, for severe asthma, 460-461
- Fentanyl, in airway management, 24
- Fiber(s), in skeletal muscles, 622
- type I, 173-174
- in exercise training, 216
- type II, 174
- in exercise training, 216
- Fistula, tracheoesophageal, respiratory distress due to, 58
- Fitness, maintenance of, through exercise training program, 224-225
- Flail chest, diagnosis and treatment, 142-143
- Flow meters, in cardiopulmonary exercise testing, 195
- Flow-volume loops, abnormalities of, in ventilatory impairment in neuromuscular disease, 756
- Fluid status, assessment, in COPD patients with acute respiratory failure, 485
- Fluids, for ARDS, 536-538
- Flumazenil, in airway management, 24
- Foreign body aspiration, emergencies related to, 117-135. See also *Aspiration.*
- radiographic findings in, 120
- upper airway obstruction due to, 42
- Fracture(s), rib, in COPD patients with acute respiratory failure, 486
- diagnosis and treatment, 142
- sternal, diagnosis and treatment, 142
- Fuel cell analyzers, in cardiopulmonary exercise testing, 195
- Functional stridor, upper airway obstruction due to, 41
- Fungal infection, massive hemoptysis due to, 150
- Gas(es), respiratory, irritant, inhalation injury due to, 103-110
- sources of exposure to, 104
- Gas analyzers, in cardiopulmonary exercise testing, 195
- Gas exchange, during exercise, in the elderly, 237-238
- in interstitial lung disease, 291-292
- exercise testing effects on, 181-184
- physiology of, 1-2
- pulmonary, in cardiopulmonary exercise testing, 208-209
- Gastric distention, in COPD patients with acute respiratory failure, 492-493
- Gastrointestinal bleeding, in COPD patients with acute respiratory failure, 492-493

- Gender, of exercise training program participants, 224
- Great vessel trauma, diagnosis and treatment, 143-144
- Guillain-Barré syndrome, described, 705
- incidence, 705
 - respiratory failure in, 706-707
 - respiratory function in, assessment, 707-710
 - disorders of, 705-714
 - management, 710-712
 - treatment, 712-713
 - ventilatory support in, 776
- Haemophilus influenzae*, respiratory failure in COPD due to, 483-484
- HAPE, 509-512
- Head injuries, respiratory care in, 743-744
- Health, exercise training and, 225
- Heart, function of, exercise in COPD and, 314
- exercise in interstitial lung disease and, 292
 - transplantation of, cardiopulmonary exercise testing for, 280-282
- Heart disease, congenital, massive hemoptysis due to, 150-151
- exertional dyspnea and, 262-263
 - valvular, pulmonary edema due to, 506-507
- Heart failure, cardiopulmonary exercise testing for, response to, 282
- chronic, cardiopulmonary exercise testing for, 280
- Heart function, assessment, in COPD patients with acute respiratory failure, 485
- Heart-lung transplantation, exercise limitation in, 416-418
- exercise testing in, 415-416
 - guidance provided by, 418-419
- Heart rate, in cardiopulmonary exercise testing, 424-425
- noninvasive, 275-277
 - in exercise training program, 221-222
- Heat loss, exercise-induced asthma due to, 353-354
- Helium-oxygen, in upper airway obstruction, 47-48
- Hemlock, poisoning due to, 100
- Hemoptysis, cryptogenic, 154
- iatrogenic, 152
 - massive, 147-168
 - airway management in, 28
 - alveolar hemorrhage and, 152
 - autoimmune disease and, 152
 - bronchiectasis and, 149
 - causes, 148-154
 - cystic fibrosis and, 152
 - defined, 28, 147
 - described, 147
 - fungal infection and, 150
 - localization of the bleeding site in, 154-157
 - lung abscess and, 150
 - management, 157-163
 - mitral stenosis/congenital heart disease and, 150-151
 - outcome, 163-164
 - tuberculosis and, 148-149
 - tumors and, 151-152
 - vascular anomalies and, 152, 154
- Hemorrhage, alveolar, massive hemoptysis due to, 152
- Hemothorax, in chest trauma, 139-140
- Heparin, for pulmonary embolism, 551-552
- Heroin, respiratory insufficiency due to, 98
- Hiccup, stroke and, 734
- in ventilatory impairment in neuromuscular disease, 754
- Hot-wire, in cardiopulmonary exercise testing, 195
- Hydrocarbon ingestion, 125-127
- Hydrocortisone, intravenous, respiratory failure due to, 94
- for severe asthma, 461-463
- Hydrogen chloride, inhalation injury due to, 106-107
- Hydrogen cyanide, inhalation injury due to, 111-112
- Hydrogen fluoride, inhalation injury due to, 106-107
- Hydrogen sulfide, inhalation injury due to, 112
- Hyperadrenocorticism, respiratory dysfunction in, 671
- Hypercapnia, unexplained, in ventilatory impairment in neuromuscular disease, 760-761
- Hyperinflation, dynamic (DHI), 466-468
- Hypertension, pulmonary, cardiopulmonary exercise testing for, 283-284
- Hyperventilation, for head and spinal cord injuries, 744
- Hypocapnia, in asthma, 457
- Hypotension, in pulmonary embolism, 556-557
- Hypothyroidism, respiratory dysfunction in, 670-671
- Hypoventilation, in acute respiratory failure, 4
- central, drugs associated with, 97
 - controlled, 465
- Hypoxemia, arterial, CNS injury and, 741
- in asthma, 457
 - correction of, in COPD patients with acute respiratory failure, 487-489
- Ileus, intestinal, in COPD patients with acute respiratory failure, 492-493
- Impairment, disability versus, 370-371
- Impairment evaluation, exercise testing in, 369-387
- application of, examples, 381-384
 - integrative cardiopulmonary, 378-381
 - physiologic basis for, 373-377
 - recommendations for, 384-385
- Infection(s), acute lung injury and, 522
- airway, respiratory failure in COPD due to, 483-484
 - fungal, massive hemoptysis due to, 150
 - nosocomial, in COPD patients with acute respiratory failure, 493
 - upper airway obstruction due to, 43-44
- Inferior vena cava (IVC) filter, for pulmonary embolism, 555-556
- Inflammation, exercise-induced asthma due to, 354-355
- Inflammatory myopathies, respiratory dysfunction in, 669-670
- Informed consent, for respiratory care in neuromuscular disease, 789-790
- Infrared analyzer, in cardiopulmonary exercise testing, 195
- Inhalation injury, acute, 103-116
- asphyxiants and, 110-112
 - irritant gases and, 103-110
 - smoke inhalation and, 112-114
 - systemic toxins and, 112
 - upper airway obstruction due to, 41-42
- Inhaler(s), metered dose (MDI), for respiratory failure in COPD, 489-490
- Inspiratory muscle(s), accessory, described, 340
- Inspissated secretions, respiratory distress due to, 57
- Insulin, respiratory failure due to, 97
- Intensive care unit (ICU), for respiratory failure in COPD, 486-487
- Intercostal muscles, 630
- Interleukin-2, respiratory failure due to, 97
- Intestinal ileus, in COPD patients with acute respiratory failure, 492-493
- Intubation, difficult, 17-18
- endotracheal, complications, 18-20

Intubation (*Continued*)

- for Guillain-Barré syndrome, 710-711
- route selection for, 16-17
- tube position in, 17
- nasotracheal, 15-16
- orotracheal, 15
- tracheal, airway injury following, 39-41
- tracheal stenosis due to, 39
- translaryngeal, airway injury following, 39
- complications, 18-20
- nonsurgical routes, 15-20
- types, 15-18
- Ipratropium, in exercise-induced asthma, 361
- for respiratory failure in COPD, 490
- for severe asthma, 460-461
- Isoproterenol, for severe asthma, 457-458

Kyphoscoliosis, 774

- Lactate threshold, 180-181
- indices of, 177, 178
- Laryngospasm, intubation and, 40-41
- Laryngotracheal resection and reconstruction, in upper airway obstruction, 48
- Laryngotracheobronchitis, upper airway obstruction due to, 43
- Laser therapy, in upper airway obstruction, 48
- Latissimus dorsi muscle, 632
- Legal issues, in long-term ventilatory support, 787-789
- Levator costarum muscles, 632
- Lidocaine, in airway management, 23-24
- Limb girdle dystrophy, respiratory dysfunction in, 666
- Ludwig's angina, upper airway obstruction due to, 44
- Lung(s), function of, in lung disease, 376-377
 - predicting exercise performance from, 374-376
 - mechanics of, exercise in COPD and, 310-311
 - vascular anatomy of, 147-148
- Lung abscess, massive hemoptysis due to, 150
- Lung disease(s), diffusing capacity in, 377
- exercise capacity in, 376-377
- exercise gas exchange in, 377
- exercise in, blood gas changes due to, 332-333
- interstitial, exercise limitation in, 294-296
- exercise performance in, therapeutic modalities to alter, 299-300
- exercise testing in, 287-303
 - clinical uses, 296-297
 - conduct and interpretation of, 297-299
 - physiology of, 287-296
- leading to impairment from occupational injury, 373
- pulmonary function in, 376-377
- Lung injury, acute, 517-546. *See also Adult respiratory distress syndrome.*
 - causes, 521-523
 - clinical course, 523-525
 - clinical evolution of, 520
 - defined, 518
 - drug-induced, 522-523
 - management, 525-541
 - colloids, 538
 - corticosteroids, 541
 - drugs, new, 539-541
 - fluids, 536-538
 - goals of, 525
 - hemodynamic support, 536-539
 - NSAIDs, 541
 - oxygenation and ventilatory support, 528-536
 - prostaglandin E₁, 540
 - Swan-Ganz catheters, 538-539
 - of underlying illness, 526-528
 - outcome following, 523-525
 - pathophysiology, 519-520
 - PEEP in, 528-530
 - predisposing conditions, 521-523
 - prognostic factors in, 523
 - risk factors for, 521-523
- mechanical ventilation and, 530

Lung resection, evaluation, 389-403

- diffusing capacity in, 390
- exercise testing in, 393-400
 - "high-tech," 397-400
 - incremental, 397-399
 - "low-tech," 395-397
 - methods, 395
 - submaximal, 399-400
- invasive cardiac catheterization in, 390-391
- risk stratification analysis in, 392-393
- spirometry in, 389-390
- split lung function studies in, 391-392
- Lung score, components of, 518
- Lung transplantation, exercise limitation in, 416-418
 - exercise testing in, 405-420
 - bilateral-lung, 408, 411-415
 - guidance provided by, 418-419
 - single-lung, 407-408, 409, 410
 - at Washington University/Barnes Hospital, 406-415
- Lymphomatosis, intravascular, 569-570

- Magnesium sulfate, for severe asthma, 463
- Magnetic resonance imaging (MRI), upper airway obstruction due to, 45-46
- Mass spectrometer, in cardiopulmonary exercise testing, 195
- Massive hemoptysis, 147-168. *See also Hemoptysis, massive.*
- Maximal oxygen consumption, in cardiopulmonary exercise testing, 203-204
 - defined, 203
- Maximal voluntary ventilation, in ventilatory impairment in neuromuscular disease, 756
- Mechanical simulator, in cardiopulmonary exercise testing, 198
- Mechanical ventilation, in Guillain-Barré syndrome, 711
- Metabolic acidosis, exercise in COPD and, 314-315
- Metabolic myopathies, respiratory dysfunction in, 667-668
- Metabolic rate, exercise in COPD and, 306-308
- Metered-dose inhaler (MDI), for respiratory failure in COPD, 489-490
- Methadone, respiratory insufficiency due to, 98
- Methane, inhalation injury due to, 110
- Methotrexate, respiratory failure due to, 95-96
- Methylprednisolone, for fat embolism syndrome, 566
- for respiratory failure in COPD, 491
- for severe asthma, 461-462
- Midazolam, in airway management, 24
- Mitochondrial myopathies, respiratory dysfunction in, 667-668
- Mitral insufficiency, in acute cardiogenic pulmonary edema, 507
- Mitral stenosis, massive hemoptysis due to, 150-151
- Mixing chamber, in cardiopulmonary exercise testing, 197
- Mouth occlusion pressure, evaluation, 610

- Mucus, secretion of, alterations in, 742
- Multiple sclerosis, described, 693
- prevalence, 693
 - pulmonary edema in, 698-699
 - respiratory dysfunction in, 693-693
 - monitoring of, 699-700
 - treatment, 700-702
 - respiratory involvement in, 693-698
 - ventilatory support in, 776
- Multiple system atrophy, 720
- Muscle(s), abdominal, 630-631
- in exercise testing in pulmonary patients, neural control and coordination of, 341-342
 - expiratory, described, 340-341
 - fiber-type composition of, 181
 - inspiratory, accessory, described, 340
 - fatigue of, exercise in COPD and, 313
 - intercostal, 630
 - latissimus dorsi, 632
 - levator costarum, 632
 - metabolism of, during exercise, 249-250
 - parasternal, 629-630
 - pectoralis major, 631-632
 - respiratory. *See Respiratory muscle(s).*
 - scalene, 629
 - skeletal, contractile cells in, 216
 - energetics of, 173-176
 - in exercise training, 215-227
 - sternomastoid, 630
 - triangularis sterni, 631-632
 - upper airway, 632-633
 - weakness of, in ventilatory impairment in neuromuscular disease, 752-753
- Muscle contraction, respiratory, inappropriate, syndromes of, 754-755
- Muscle relaxant(s), in airway management, 24-25
- Muscular dystrophies, Duchenne. *See Duchenne muscular dystrophy.*
- facioscapulohumeral, ventilatory responses in, 613
 - oculopharyngeal, 666
 - ventilatory support in, 773-775
- Mushrooms, poisoning due to, 100
- Myasthenia gravis, classification of, 686
- clinical features, 685
 - described, 683
 - diagnosis, 687
 - differential diagnosis, 687-688
 - pathophysiology, 683
 - prevalence, 685
 - respiratory dysfunction in, 683-691
 - assessment, 688
 - management, 688-689
 - respiratory system involvement in, 683-685
 - systems affected by, 685-686
 - ventilatory support in, 775-776
- Mycoplasma pneumoniae*, respiratory failure in COPD due to, 484
- Myocardial contusion, diagnosis and treatment, 143
- Myopathy(ies), acute steroid, respiratory dysfunction in, 671
- congenital, respiratory dysfunction in, 666-667
 - endocrine, respiratory dysfunction in, 670-671
 - inflammatory, respiratory dysfunction in, 669-670
 - metabolic, respiratory dysfunction in, 667-668
 - mitochondrial, respiratory dysfunction in, 667-668
 - progressive, ventilatory support in, 773-775
 - and sleep disorders, 662
- Myosin heavy chain phenotype, in diaphragm muscle, 647-648
- Myotonic dystrophy, respiratory dysfunction in, 665-666
- Naloxone, respiratory failure due to, 94
- Near-drowning, 128-130
- Nebulizer(s), in-line, respiratory distress due to, 59-60
- Nedocromil, in exercise-induced asthma, 360
- Negative pressure ventilation, in neuromuscular disease, 767-768
- Neuromuscular blockade, drugs causing, 97
- respiratory failure due to, 96
- Neuromuscular disease, abdominal displacement ventilators in, 768-769
- brainstem and, 614
 - diffuse, 753-754
 - mechanical ventilation in, 765-781
 - negative pressure ventilation in, 767-768
 - positive pressure ventilation in, 765-767
 - respiratory dysfunction in, issue on, 607-795
 - long-term care, 784-787
 - management, 783-795
 - life-sustaining, refusal of, 790
 - right to refuse, 790-791
 - mechanical ventilation for, withdrawal of, 791-792
 - rehabilitation for, 784-787
 - surrogate decision-making in, 792-793
 - respiratory muscle disorders due to, 619-639
 - sleep and, 613-614
 - ventilation in, central control of, 607-617
 - laboratory evaluations in, 609-610
 - ventilator selection in, 771-772
 - ventilatory control in, measures of, 613
 - ventilatory function in, assessment, 751-763. *See also Ventilatory failure, assessment, in neuromuscular disease.*
 - ventilatory response in, 611-612
- Nitrofurantoin, respiratory failure due to, 96
- Nitrogen dioxide, inhalation injury due to, 107-108
- Noncompliance, respiratory failure in COPD due to, 486
- Nosocomial infections, in COPD patients with acute respiratory failure, 493
- NSAIDs. *See Anti-inflammatory drugs, nonsteroidal.*
- Nuclear imaging studies, for localization of bleeding in massive hemoptysis, 157
- Oculopharyngeal muscular dystrophy, respiratory dysfunction in, 666
- Ondine's syndrome, 731-733
- Opioids, in airway management, 24
- Organophosphate(s), poisoning due to, 99-100
- Oxidation, substrate, oxygen and carbon dioxide demands of, 175
- Oximetry, pulse, in cardiopulmonary exercise testing, 202-203
- Oxygen, inspired, reduction of, in acute respiratory failure, 7-8
- reduced requirements for, in acute respiratory failure, 11
 - role during exercise, 249
 - in skeletal muscle energetics, 175-176
- Oxygen pulse, in cardiopulmonary exercise testing, 207
- noninvasive, 277
- Oxygen therapy, in acute respiratory failure, 11
- Oxygen transport, respiratory failure effects on, 11
- Oxygen uptake, exercise training effects on, 216-220
- in exercise training program, 222
 - maximal, in noninvasive cardiopulmonary exercise testing, 271-273
- Oxygen ventilatory response, evaluation, 609
- Oxyhemoglobin saturation, in ventilatory impairment in neuromuscular disease, 755

Ozone, inhalation injury due to, 108

P_{ALI}, and neuromuscular disease, 612-613

Pain, respiratory distress due to, 58

Pancuronium, in airway management, 24

Paralysis, diaphragmatic, in ventilatory impairment in neuromuscular disease, 754

periodic, respiratory dysfunction in, 668-669

for severe asthma, 469-471

Paralysis agitans, 715

Paramagnetic analyzer, in cardiopulmonary exercise testing, 195

Paraquat, poisoning due to, 99

Parasternal muscles, 629-630

Parkinsonism, 715

idiopathic, 719-720

postencephalic, 720-721

Parkinson's disease, clinical features, 715

pulmonary mechanics in, 716-718

respiratory dysfunction in, 715-727

medications and, 721-724

ventilatory support in, 777

Patient autonomy, for respiratory care in neuromuscular disease, 789-790

Pectoralis major muscle, clavicular head of, 631-632

Penicillamine, respiratory failure due to, 95

Percutaneous transtracheal ventilation, in airway management, 21-22

Perfusion, patterns of, 2

Periodic paralysis, respiratory dysfunction in, 668-669

Petroleum distillates, poisoning due to, 99

Phenothiazine(s), acute pulmonary insufficiency due to, 98

Phosgene, inhalation injury due to, 108-109

Phrenic nerves, stimulation of, in ventilatory impairment in neuromuscular disease, 759

Physical therapy, chest, for Guillain-Barré syndrome, 710

Pitressin, in massive hemoptysis management, 158-159

Pleural effusions, in COPD patients with acute respiratory failure, 486

Pleuropulmonary disease, ergot derivatives and, 724

Pneumocystis carinii pneumonia, spontaneous pneumothorax in, 80-81

Pneumomediastinum, 86-87

Pneumonia, bacterial, CNS injury and, 743

community-acquired, 581-592

atypical, 586-589

clinical features, 586-588

described, 586

diagnosis, 588-589

pathogenesis, 586

treatment, 590-591

severe, prevention, 591-592

treatment, 589-591

typical, 581-586

clinical features, 584

described, 581

diagnosis, 584-586

microbiology of, 583-584

pathogenesis, 581-583

treatment, 590

life-threatening, 581-602

nosocomial, 592-598

cellular and immunologic compromise in, 594

clearance of aspirated secretions in, 593-594

clinical features, 594-595

diagnosis, 594-597

endotracheal and nasogastric tubes in, 593

host defense mechanisms in, 593-594

increased aspiration in, 593

microbiology of, 594

oropharyngeal colonization in, 592-593

pathogenesis, 592-593

prevention, 598

treatment, 598-599

Pneumocystis carinii, spontaneous pneumothorax in, 80-81

Pneumopericardium, 88

Pneumoperitoneum, 88

Pneumothorax, 75-86

catamenial, 80

in chest trauma, 138

clinical forms of, 75

defined, 75

drug abuse-related, 80

iatrogenic, 81

management, 89

mechanical ventilation-related, 81-83

management, 89-90

spontaneous, in COPD patients with acute respiratory failure, 486

primary, 77-79

management, 89

secondary, 79-81

COPD in, 79-80

management, 89

Pneumocystis carinii pneumonia in, 80-81

tension, 85-86

management, 89

mechanical ventilation and, 530-532

traumatic, 83-85

management, 90

types, 77

Poisonings, agents associated with, 99-100

cyanide, treatment, 111

Polysomnography, in ventilatory impairment in neuromuscular disease, 759-760

Positive end-expiratory pressure (PEEP), for acute lung injury, 528-530

for Guillain-Barré syndrome, 711

for head and spinal cord injuries, 745

Positive pressure ventilation, in neuromuscular disease, 765-767

Prednisolone, for severe asthma, 461-462

Progressive myopathies, ventilatory support in, 773-775

Propoxyphene, respiratory insufficiency due to, 98

Prospective Investigation of Pulmonary Embolism

Diagnosis (PIOPED), 550-551

Prostaglandin(s), for acute lung injury, 540

Protamine, respiratory failure due to, 95

Protected specimen brush (PSB), quantitative culture of, in nosocomial pneumonia diagnosis, 595-596

Protocols, Balke, 198-199

Bruce, 198

in cardiopulmonary exercise testing, 198-200

for exercise testing in COPD, 320

for exercise testing in pulmonary rehabilitation, 334

Pulmonary artery catheterization, in acute cardiogenic pulmonary edema, 507-508

Pulmonary congestion, during exercise, in the elderly, 240

Pulmonary disease(s), chronic obstructive, spontaneous pneumothorax, 79-80

Pulmonary edema, acute cardiogenic, 501-515

aortic insufficiency in, 507

aortic stenosis and, 506-507

causes, 501

diastolic dysfunction in, 506

- mitral insufficiency in, 507
- pathophysiology, 501-504
- pulmonary edema fluid sampling in, 508
- pulmonary artery catheterization in, 507-508
- radiographic evidence of, 504-505
- treatment, 508
- high-altitude (HAPE), 509-512
- in multiple sclerosis, 698-699
- neurogenic, 512-514
 - CNS injury and, 742-743
- postobstructive, 512
- re-expansion, 509
 - management, 90
- unusual forms of, 508-514
- valvular heart disease and, 506-507
- Pulmonary edema fluid sampling, in acute cardiogenic pulmonary edema, 508
- Pulmonary embolism, CNS injury and, 743
 - incidence, 547
 - massive, 547-560
 - causes, 547-548
 - clinical examples, 557-558
 - diagnosis, 550-551
 - hypotension, 556-557
 - mortality due to, 547
 - pathophysiology, 548-550
 - treatment, 551-557
 - anticoagulation, 551-553
 - embolectomy, 556
 - inferior vena cava filter in, 555-556
 - thrombolytic therapy, 553-555
 - respiratory failure in COPD due to, 484-485
 - unusual forms of, 561-580
- Pulmonary function testing, in ALS, 676-679
 - in Guillain-Barré syndrome, 708-710
 - in ventilatory impairment in neuromuscular disease, 755-756
- Pulmonary gas exchange, in cardiopulmonary exercise testing, 208-209, 427-430
- Pulmonary gas exchange inefficiency, during exercise, 250
- Pulmonary mechanics, alterations in, CNS injury and, 742
- Pulmonary rehabilitation, exercise in, 327-337
 - laboratory testing procedures, 333-335
 - types, 333-334
 - exercise testing in, to assess exercise limitation, 330
 - to assess exercise tolerance, 329-330
 - blood gas changes, 332-333
 - bronchospasm due to, 333
 - exercise prescription in, 330-332
 - measurements for, 334-335
 - protocols for, 334
 - uses, 328-333
 - exercise training responses in, mechanisms of, 328
 - for respiratory disorders, in neuromuscular disease, 784-787
- Pulmonary system, exercise effects on, in the elderly, 229-246
 - breathing pattern, 232-233
 - dyspnea, 239
 - gas exchange, 237-238
 - mechanics of, 233-237
 - pulmonary congestion, 240
 - pulmonary hemodynamic response, 238-239
 - respiratory muscle fatigue, 239-240
 - responses, 240-241
 - ventilatory response, 231-232
 - in young adults, 229-230
 - limitations of, to exercise performance, in the elderly, 241-243
- Pulmonary vascular disease, cardiopulmonary exercise testing for, 283-284
- Pulse oximetry, in cardiopulmonary exercise testing, 202-203
- Quality assurance, in cardiopulmonary exercise testing, 197-198
- Radiation therapy, in massive hemoptysis management, 159
- Radiography, chest, in acute cardiogenic pulmonary edema, 504-505
 - in asthma, 457
 - in upper airway obstruction evaluation, 45
- Reference values, in cardiopulmonary exercise testing, 209-210
- Rehabilitation, pulmonary. *See Pulmonary rehabilitation.*
- Respiration, brainstem, and Ondine's syndrome, 731-733
 - defined, 1
 - limbic, stroke and, 734
 - voluntary controlled, stroke and, 733-734
- Respiratory disease, exertional dyspnea and, 263-264
- Respiratory distress, in the ventilated patient, 55-73. *See also Ventilation, mechanical.*
 - assessment and management, 66-69
 - causes, 56
 - cough due to tracheal irritation and, 58
 - endotracheal tube failure and, 57-58
 - inspissated secretions and, 57
 - paralytics for, 69-70
 - recognition of, 65
 - sedatives for, 69-70
- Respiratory failure, acute, abnormal diffusion in, 7
 - causes, pathophysiologic, 3-8
 - clinical classification, 8-10
 - gas exchange in, 1-2
 - hypoventilation in, 4
 - oxygen transport effects, 11
 - P(A-a)O₂ in, 2-3
 - pathophysiology of, 1-12
 - reduction of inspired oxygen in, 7-8
 - shunt in, 6-7
 - treatment, 10-11
 - venous admixture in, 8
 - ventilation-perfusion mismatch in, 4-6
- in ALS, 675-676
- in COPD, 481-500. *See also Chronic obstructive pulmonary disease (COPD), acute respiratory failure in.*
 - defined, 1
 - diagnosis, 1
 - drugs and, 93-102. *See also Drug(s), respiratory failure due to.*
 - in Guillain-Barré syndrome, 706-707
 - in myasthenia gravis, 689
 - in myopathic disease, treatment, 662-663
 - processes involved in, 1
 - treatment, 679
- Respiratory function, assessment, 661-662
 - disorders of, 661-674
 - in acquired myopathies, 669-672
 - in ALS, 675-681. *See also Amyotrophic lateral sclerosis (ALS), respiratory dysfunction in.*
 - causes, 620-621

Respiratory function (Continued)

- CNS trauma and, 739-749. See also *Central nervous system (CNS), trauma to, respiratory dysfunction associated with.*
- in Guillain-Barré syndrome, 705-714. See also *Guillain-Barré syndrome, respiratory failure in.*
- inherited myopathic, 663-669
- in multiple sclerosis, 693-603. See also *Multiple sclerosis, respiratory dysfunction in.*
- in myasthenia gravis, 683-691. See also *Myasthenia gravis, respiratory dysfunction in.*
- in neuromuscular disease, management, 783-795
- in parkinsonism, 715-727. See also *Parkinson's disease, respiratory dysfunction in.*
- in stroke, 729-737. See also *Stroke, respiratory dysfunction in.*
- in Duchenne muscular dystrophy, 663-664
 - overview of, 619-639
- Respiratory insufficiency, acute, drugs causing, 97-98
- Respiratory muscle(s), activity of, during exercise, 252
 - blood flow in, 341
 - and circulation, 626-627
 - composition of, 341
 - contraction patterns of, exercise in COPD and, 312-313
 - coordination of, 341, 633-634
 - of the diaphragm, 627-629
 - disorders of, secondary effects on, 634
 - evaluation, 610
 - during exercise, in interstitial lung disease, 292-294
 - fiber types in, 622
 - function of, in ventilatory impairment in neuromuscular disease, 756-759
 - impulse to inspiration, 627
 - innervation of, 753
 - mechanical properties of, 622-624
 - metabolism of, 341
 - myasthenia gravis effects on, 683-684
 - neural connections of, 625, 626
 - neural control and coordination of, 341-342
 - as skeletal muscles, 622
 - strength of, 756-757
 - weakness and fatigue of, during exercise, 252
- Respiratory muscle fatigue, 624-625
 - during exercise, in the elderly, 239-240
- Respiratory muscle training, in myopathies, 662
- Respiratory system, in cardiopulmonary exercise testing, 425
 - components of, 619
 - emergencies related to, airway management in, 13-34.
 - See also *Airway management, in respiratory emergencies.*
 - issue on, 1-168, 453-602
 - Rhabdomyolysis, respiratory dysfunction in, 671-672
 - Rib(s), fractures of, in COPD patients with acute respiratory failure, 486
 - diagnosis and treatment, 142
 - Rib cage, analysis of, in ventilatory impairment in neuromuscular disease, 758-759
 - Salbutamol, for severe asthma, 458-459
 - Salicylates, acute lung injury due to, 523
 - respiratory failure due to, 94
 - Scalene muscles, 629
 - Sedative(s), in airway management, 24
 - for respiratory distress, 69-70
 - for severe asthma, 469-471
 - Sepsis syndrome, acute lung injury due to, 522
 - Sex, of exercise training program participants, 224
 - Shunt, physiologic, in acute respiratory failure, 6-7
 - defined, 6
 - Shy-Drager syndrome, 720
 - Skeletal muscles, respiratory muscles as, 622
 - Sleep disorders, myopathy and, 662
 - and neuromuscular disease, 613-614
 - in ventilatory impairment in neuromuscular disease, 752
 - Slow twitch, 173
 - Smoke inhalation, acrolein, 113
 - clinical manifestations, 113-114
 - inhalation injury due to, 112-114
 - treatment, 114
 - Spectrometer, mass, in cardiopulmonary exercise testing, 195
 - Spinal cord, injuries of, respiratory care in, 743-744
 - in ventilatory impairment in neuromuscular disease, 754
 - ventilatory support in, 777-778
 - Spine injury, cervical, airway management in, 25-26
 - Spirometry, in Guillain-Barré syndrome, 710
 - in lung resection evaluation, 389-390
 - in myasthenia gravis, 684-685
 - in upper airway obstruction evaluation, 44-45
 - in ventilatory impairment in neuromuscular disease, 755-756
 - Split lung function studies, in lung resection evaluation, 391-392
 - Spontaneous pneumothorax, in COPD patients with acute respiratory failure, 486
 - Sputum examination, in nosocomial pneumonia
 - diagnosis, 595
 - Starling equation, 501
 - Sternomastoid muscle, 630
 - Sternum, fractures of, diagnosis and treatment, 142
 - Strength training, purpose of, 215
 - Streptococcus pneumoniae*, respiratory failure in COPD due to, 483-484
 - Streptokinase, for pulmonary embolism, 554
 - Stridor, acoustic analysis of, 46
 - Stroke, brainstem, 730-731
 - cough and, 734
 - hemispheric, 729-730
 - hiccup and, 734
 - limbic respiration and, 734
 - respiratory dysfunction in, 729-737
 - prognostic value of, 734-736
 - ventilatory support in, 777
 - voluntary controlled respiration and, 733-734
 - Succinylcholine, in airway management, 24
 - Suctioning, for head and spinal cord injuries, 744-745
 - Sulfur dioxide, inhalation injury due to, 109
 - Surgery, in massive hemoptysis management, 162-163
 - Surrogate decision-making, in Duchenne muscular dystrophy, 792-793
 - Swallowing, in ventilatory impairment in neuromuscular disease, 752
 - Swan-Ganz catheters, for acute lung injury, 538-539
 - Systemic lupus erythematosus (SLE), respiratory dysfunction in, 670
 - Systolic dysfunction, cardiopulmonary exercise testing for, 279-280
 - Tachypnea, in acute lung injury, 520
 - Tension pneumothorax, mechanical ventilation and, 530-532
 - Terbutaline, for severe asthma, 458
 - Terfenadine, in exercise-induced asthma, 361

- Tetracaine, in airway management, 23-24
- Thallium-dipyridamole imaging, respiratory failure due to, 97
- Theophylline, in exercise-induced asthma, 360-361
for respiratory failure in COPD, 490-491
for severe asthma, 459
- Thoracotomy, emergency room, in chest trauma, 141
- Thromboembolism, concept of, 547-548
predisposing factors of, 548
pulmonary, in COPD patients with acute respiratory failure, 492
- Thrombolytic therapy, for pulmonary embolism, 553-555
- Tissue plasminogen activator (TPA), for pulmonary embolism, 554
- Tocolytic(s), respiratory failure due to, 95
- Toxins, systemic, inhalation injury due to, 112
types, 99-100
- Tracheal gas insufflation, for acute lung injury, 534-535
- Tracheal stenosis, intubation and, 39
- Tracheobronchial injuries, diagnosis and treatment, 144-145
- Tracheoesophageal fistula, respiratory distress due to, 58
- Tracheostomy, emergency, in airway management, 22-23
for Guillain-Barré syndrome, 711
- Tracheostomy tube, malposition of, respiratory distress due to, 56-57
- Tracheotomy, airway injury following, 39-40
- Transdiaphragmatic pressure, in ventilatory impairment in neuromuscular disease, 757-758
- Transplantation, heart, cardiopulmonary exercise testing for, 280-282
heart-lung, exercise limitation in, 416-418
exercise testing in, 415-416
guidance provided by, 418-419
lung. *See Lung transplantation.*
- Trans thoracic needle aspiration, in nosocomial pneumonia diagnosis, 596-597
- Trapezius muscle, 632
- Trauma, airway management in, 25-28
chest, 137-146. *See also Chest trauma.*
airway management in, 27-28
craniofacial, airway management in, 26-27
great vessel, diagnosis and treatment, 143-144
pneumothorax associated with, 83-85
spinal, airway management in, 25-26
- Treadmill, in cardiopulmonary exercise testing, 193-194
protocols in, 198-199
- Triangularis sterni muscles, 631-632
- Tuberculosis, massive hemoptysis due to, 148-149
- Tumor(s), massive hemoptysis due to, 151-152
upper airway obstruction due to, 44
- Tumor embolism, 568-569
- Turbine, in cardiopulmonary exercise testing, 195
- Urokinase, for pulmonary embolism, 554
- Valvular heart disease, pulmonary edema due to, 506-507
- Vasoconstrictive agents, in massive hemoptysis management, 158-159
- Vasodilator(s), for acute lung injury, 540
- Vecuronium, in airway management, 24
- Venous admixture, in acute respiratory failure, 8
described, 8
- Venous air embolism, 570-574
causes, 570-571
clinical manifestations, 572
diagnosis, 572
pathophysiology, 571-572
treatment, 572-574
- Ventilation, alveolar, increased, during exercise, 250
artificial, for respiratory failure, in ALS, 679-680
control of, in Parkinson's disease, 718-719
endotracheal, for severe asthma, 463-465
during exercise, in interstitial lung disease, 288-290
exercise in COPD and, 308-309
in exercise testing in pulmonary patients, 335
high-frequency, for acute lung injury, 535
inverse-ratio, for acute lung injury, 534
measurements of, in noninvasive cardiopulmonary exercise testing, 278
mechanical, for acute cardiogenic pulmonary edema, 508
for acute lung injury, 528-530
alveolar rupture due to, 530-532
artificial airway problems in, 56-59
asynchrony due to, 61-62
auto-PEEP due to, 62-64
barotrauma due to, 64-65, 530-532
in COPD patients with acute respiratory failure, complications, 493
dynamic hyperinflation due to, 62-64
external ventilator circuit complications, 59-60
goals of, 55
for head and spinal cord injuries, 746
lung injury associated with, 530-532
machine malfunction, 60-61
for neuromuscular disease, 765-781. *See also specific types of ventilation.*
indications for, 770-771
initiation of, 772-773
mechanisms of action of, 769-770
monitoring and follow-up, 773
withdrawal of, 791-792
patient-ventilator system problems, 61-65
pneumothorax associated with, 81-83
management, 89-90
problems related to, 55-65
respiratory distress during, 55-73. *See also Respiratory distress, in the ventilated patient.*
causes, 56
for respiratory failure in COPD, 493-495
for severe asthma, 465-469
tension pneumothorax due to, 530-532
negative pressure, in neuromuscular disease, 767-768
in neuromuscular disease, 607-617
patterns of, 2
positive pressure, in neuromuscular disease, 765-767
pressure-controlled, for acute lung injury, 534
pulmonary, exercise training effects on, 218
unilateral lung, in massive hemoptysis management, 159-160
- Ventilation-perfusion mismatch, in acute respiratory failure, 4-6
- Ventilators, abdominal displacement, in neuromuscular disease, 768-769
complications, 60-61
external circuit, respiratory distress due to, 59-60
in neuromuscular disease, selection of, 771-772
- Ventilatory failure, 10
assessment, in neuromuscular disease, 751-763
history in, 752-753
laboratory evaluation, 755-761
physical examination in, 753-755
- Ventilatory response, to exercise testing, 184-186

- Ventilatory response (*Continued*)
 - in neuromuscular disease, 611
 - reduced, in neuromuscular disease, 611-612
- Ventilatory support, long-term, ethical and legal issues in, 787-789
 - for respiratory failure in myopathic disease, 662-663
- Vocal-cord dysfunction, functional, upper airway obstruction due to, 41
- Volume at end-expiration (V_E), 466
- Volume at end-inspiration (V_I), 466
- Washington University/Barnes Hospital, lung transplantation at, exercise testing in, 406-415
- Water loss, exercise-induced asthma due to, 353-354
- Wheezing, in asthma, 455
- Zirconium electrochemical cell, in cardiopulmonary exercise testing, 195

